increase to the size of Y by September, it might then be 45 millim. by 56 millim. by next June. It is also probable that in confinement the young *Carcini* do not develop exactly with the same rapidity as they would in their natural haunts. Doubtless the environment, the temperature, and possibly also the quantity of water and the amount and nature of the food available will all have their influence on the rapidity of growth.

PROCEEDINGS OF LEARNED SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

October 18, 1883.

Campanularia verticillata.—Prof. Macintosh exhibited a specimen of *Campanularia verticillata* differing from the type of the species in that the calicles have even rims instead of denticulate ones. The specimen was dredged in about 12 fathoms water off Greystones.

Sections of Chiton.—Prof. Haddon exhibited transverse sections of *Chiton* (*Trachydermon*) *ruber*, showing the presence of an oviduct, contrary to W. H. Dall's statement, the so-called "ovarian fenestræ" being merely the folded lips of the external openings of the oviducts.

Spore-bearing Nostoc.—Prof. M'Nab exhibited a portion of an unidentified *Nostoc* (which had presented itself in one of the conservatories at Glasnevin Botanic Gardens) in a fertile condition, that is to say, showing spores; these occurred in chains of several in a continuous row, elliptic and notably wider than the ordinary joints of the filaments, and seemingly showed no very noticeable relative distribution as regards the heterocysts. This is the second fertile *Nostoc* which has been noticed in this country, though several species have been found in that condition by Dr. Bornet, who has been so successfully studying the group.

Characters of the Hairs of Acanthus spinosus.—Mr. Greenwood Pim showed hairs from the anthers of *Acanthus spinosus*. These were of two kinds—one short and straight, forming a thick close brush along the edges of the suture of the anthers; the other longer and more flexuous, and situated on the dorsal portion of the anthers. The short straight hairs had their surfaces curiously reticulated into labyrinthiform folds of every conceivable shape, whilst the dorsal hairs were only longitudinally striate. The position of the latter differed according as they were growing on one of the posterior pairs of stamens, whose anthers are in apposition, or on the anterior pair, which are free throughout.

A Phycochromaceous Alga endowed with Motile Powers, seemingly not hitherto noticed.—Mr. Archer drew attention to what seemed yet another "unicellular phycochromaceous alga" (yet the cells often grouped), endowed with the power of automatic movement hither and thither. This did not seem to be at all the same as Lankester's (so-called) *Bacterium rubescens*, in which the cells are elongate and biscuit-shaped and bicoloured; here the cells were not elongate, were often bluntly angular, and when in the dividing state sometimes showed what might be called a "sub-*Cosmarium*-like" figure. Their action during progression was, however, comparatively feeble and vacillating, consisting of a trembling, irregularly rolling motion backwards and forwards, not a straight-ahead progress even for short distances. Just as in the similar cases of an active movement evinced by phycochromaceous cells, not any visible means was evident, that is to say, no cilia. However, as those skilled in the use of very high powers have demonstrated flagella on *Bacteria*, so most probably they are present in such cases as that now exhibited.

Cell-structure of Callithamnion and Laurencia.—Dr. E. Perceval Wright showed specimens of the cell-structure of species of *Callithamnion* and *Laurencia*, exhibiting the continuation of the cell-walls from cell to cell, which, in a living condition, allowed of the continuity of the protoplasmic contents, which he now regarded as characteristic of the Florideæ.

November 15, 1883.

Cosmarium striolatum, Näg., *ex herb. Reinsch, but seemingly a distinct species therefrom.*—Mr. Archer showed a preparation of Prof. Reinsch's containing an example of a *Cosmarium* labelled by him *Cosmarium striolatum*, Näg. This Mr. Archer thought it could not be, as Nägeli describes and figures his form as granulate, whereas the present noble form is quite distinctly just the reverse, that is to say, covered with deep hemispherical depressions (not granules) arranged in lines in such fashion that six depressions occur hexagonally and equally disposed around each single depression, taken as an individual. Thus the form does not assume that quasi-striolate appearance from which Nägeli drew his name. Prof. Reinsch's form now shown agrees no doubt fairly well in general outline with Nägeli's *Cosm. striolatum* (not yet found in this country); but Mr. Archer thought it must really be accounted a new and quite distinct species.

New Fungus from a Silo exhibited.—Mr. Pim showed a remarkable fungus from a newly-opened Silo at the Albert Institution, Glasnevin, where it tinged the affected part of the grass (ensilage) a deep red colour. This presented a densely-branched septate mycelium, on which were borne a large number of spherical sporangia, much resembling *Pythium* or *Saprolegnia*, yet having a very different aspect from those forms. The sporangia, which were sometimes

nearly sessile and at other times variously pedicellate, were filled with broadly ovate spores. Besides these sporangia a second form of fruit appeared as small obovate bodies borne on pedicles, from which they were readily detached. These had a strong cell-wall, and occasionally contained a granule, which passed out into the water and then moved for a time. In one or two instances these had given off hyphæ, seemingly from the end where they had been attached. Mr. Berkeley and Mr. W. G. Smith appear to consider this as undescribed. Pending further investigation Mr. Pim suggests that the form be named *Fenaria sanguinea*.

Section of the Fasciated Stem of Pisum sativum.—Prof. M'Nab exhibited sections of a fasciated stem of the common pea (*Pisum sativum*). The apical growth had become arrested and a circular wall, suggesting the so-called calyx-tube of a perigynous flower, had been formed, on the outer side of which leaves and flowers were developed. In the centre was a hollow tube, tapering below to a point and opening above, while still higher up one side of the tube had split and the stem formed a flat fasciated structure. The stem was much enlarged, and when flattened developed leaves &c. only on the outer side. A section of the stem low down exhibited two sets of fibro-vascular bundles with reversed orientation, the bast of the inner bundles being feebly developed and turned towards the epidermis, with stomata lining the interior of the tube. The double series of separate bundles might be considered as being formed by the bending over of the primary bundle when the arrest of growth of the apex took place, and by the growth of the ring-like structure by interealar growth; the outer series were thus developed from behind upwards, while the inner series developed from above downwards, but really from the arrested normal apex upwards to the new adventitious apex. The condition was a very peculiar one and differed from any described form of fasciation known to Dr. M'Nab.

Structure of Epidermis of Curculigo latifolia, Dryand.—Prof. M'Nab likewise showed specimens of the fibre-yielding *Curculigo latifolia*, Dryand., from Borneo, noticed by Mr. Dyer in 'Journal of Botany,' vol. ix. 1880, p. 219, as being used for making clothing. The substance consisted of a thin epidermis with stomata, and firmly attached to the epidermis were numerous strong subepidermal fibres belonging to Sachs's ground-system of tissues.

December 20, 1883.

Consecutive Transverse Sections of Alcyonium digitatum.—Prof. Haddon showed a slide containing six dozen consecutive transverse sections of a polyp of *Alcyonium digitatum*, serving as an illustration of the new method of mounting on a film of shellac.

Tetraspores of Cliftonia.—Prof. E. Perceval Wright exhibited specimens of *Cliftonia pectinata*, H., showing tetraspores, and a sketch in illustration.

Seedling Nepenthes.—Prof. M'Nab exhibited a young seedling *Nepenthes* grown in the Royal Botanic Garden, Edinburgh, and given him by Mr. Lindsay. The root was long and unbranched. The pair of cotyledons was distinctly visible, and, in addition, the plant bore four small leaves, each transformed into a pitcher with simple lid. The cotyledons produced numerous longish woolly hairs. In the pitchers the glands were visible, being much developed in the third and fourth leaf, merely indicated in the first and second. A very marked feature in the structure was the presence of wide spiral tracheæ in the pitcher and its wings and also in the cotyledons. In the fourth pitcher the remains of a small apterous insect were observable. In another minute pitcher, $\frac{1}{8}$ inch long, from another seedling, the remains of a small red spider were visible. At the side of the pitcher the spiral trachides were well developed in the wings, and apparently ended close to stomata, probably water-stomata, on the upper margin. In the body of the pitcher the spiral trachides sometimes ended in close proximity to the gland. In another pitcher, about $\frac{1}{4}$ inch long, the hairs on the margin of the lid were distinctly glandular. These frequently exhibited a central spiral, and in one case, when the "tentacle," suggesting that of a *Drosera*, had been broken across, the uncoiled spiral was shown. Many minute brown hairs were scattered over the whole external surface.

Gonium tretras exhibited.—Mr. Archer showed in a living condition the form named *Gonium tetras*, distinguished from *G. pectorale*, much more common, by its having but four, not sixteen cells, in each cœnobium, and by these being more elongate towards the aspect whence issue the flagella.

Section of Foot of fœtal Ox.—Prof. D. J. Cunningham exhibited a transverse section through the middle third of the foot of a fœtal ox, which illustrated the muscular origin of the suspensory ligament of the fetlock and the particular factors which enter into its formation.

Chætocladium Brefeldi exhibited.—Mr. Greenwood Pim showed *Chætocladium Brefeldi*, a remarkable mould which occurred in considerable abundance on a small flower-pot. The fertile hypha usually branches into three principal divisions, each terminating in a long spine, whence the name, but at each side giving rise to dichotomous branches, on which are borne bodies which formerly were considered to be conidiospores (the form being referred to *Botrytis*), but, according to Van Tieghem and Le Monnier, they are one-spored sporangia. There seems to be some doubt on the point, as Brefeld, at least some years ago, does not seem to have seen the extrusion of the spore.

February 21, 1884.

Micrasterias brachyptera, Lundell, *collected in Westmoreland by*

Mr. Bisset, and new to Great Britain, exhibited.—Mr. Archer exhibited a slide from Mr. Bisset of Banchory, Aberdeen, having two specimens of *Micrasterias brachyptera*, Lundell, from near Ambleside, in Westmoreland—the first time this striking and very distinct species has been found in Great Britain. It was probably somewhat curious to note the occurrence of this well-marked rarity amongst a number of quite common-place and familiar forms that might readily enough occur in any casual gathering in many places.

Algal Form developing in Solutions of Sulphate of Magnesia and of Lime.—Prof. E. Perceval Wright exhibited a minute phycochromaceous algal form, for the examination of which he was indebted to his colleague, Dr. Reynolds, Professor of Chemistry, who told him that for some time past the test solutions of sulphate of magnesia and of lime and of phosphate of soda had, in certain lights, presented quite a green shade. These solutions, it may be noted, were kept exposed to light and were prepared with all due care. The algal form abounded in all, but in the phosphate of soda it developed much more rapidly, so as to present, on the solution being shaken up, a dense flocculent cloud. The form seemed allied to *Chroococcus* and was immensely active in its cell-division and cell-growth.

Crystals formed in Stamen-hairs of Justicia speciosa.—Mr. Greenwood Pim exhibited crystals formed from the colouring-matter of the stamen-hairs of *Justicia speciosa*. These, which formed rapidly when the specimen was mounted in dilute glycerine jelly, presented the appearance of minute slender prisms of deep purple, all the colour being concentrated in the crystals, leaving the rest of the hair colourless. They also occur, but much less abundantly, in the petals.

Structure of Leaves of Selaginella stenophylla (A. Braun).—Dr. M'Nab exhibited the leaves of *Selaginella stenophylla* (A. Braun). Usually the parenchyma of the leaf of *Selaginella* is very uniform in character; but in this species there occur a number of elongated thickened cells or fibres scattered in the parenchyma, and at once recalling similar cells developed in the leaves of Cycads and Conifers. Up to the present Dr. M'Nab has not observed these cells in any other species of *Selaginella*.

Auditory Ossicles of Loach exhibited.—Prof. Haddon exhibited preparations of the auditory ossicles of the common loach.

Krakatoa Sand and its Constituents.—Dr. Frazer showed specimens of "Krakatoa Sand," being some of the ashes, which he obtained through the kindness of Mr. J. Joly, which fell on the deck of a Norwegian barque, 'The Borjöld.' Captain Amundsen's graphic account of the terrible earthquake at Krakatoa was laid by Dr. Haughton before a recent meeting of the Royal Dublin Society. The ashes yielded Dr. Frazer an abundance of magnetic iron, easily isolated by the action of a steel magnet. The pumice, of which

the mass of the ashes consisted, displayed under the microscope delicate threads like the well-known "Pelé's Hair," and there could be recognized marked crystals of a triclinic felspar, a monoclinic crystalline substance, augitic pyroxyene, also a rhombic mineral, probably a hypersthene. These minerals, so far as Dr. Frazer knew, were quite distinctive of this "Sand," for he had not observed any similar combination in any pumice which he had examined. Mr. Joly had also investigated this dust and had given a full communication on the subject to the Royal Dublin Society, illustrated with photographs. He found small crystals of iron pyrites and of a mineral, probably bornite; these were not noticed by Dr. Frazer. From an attentive consideration of the microscopical appearances Dr. Frazer was disposed to conjecture that steam alone was not the eruptive agent; but probably at a high temperature the steam was resolved into its gaseous elements, thus accounting for the violence of the explosion which took place and for the quantities of minute porosities visible in the pumice, which in parts recalled to mind the appearance of viscous ice, whence particles of imbedded air are gradually escaping.

March 20, 1884.

Section of Diorite from Loch Assynt.—Prof. Hull exhibited a section of a peculiar sheet of diorite of intrusive origin found in the limestone of Loch Assynt in the form of a sheet or dyke. Under a low magnifying-power it is seen to be a beautifully crystalline rock consisting of crystals of hornblende, triclinic felspar, and magnetite imbedded in a glassy paste. The polarization of the minerals was vivid, and in the case of the pyroxenic mineral indicative of hornblende rather than of augite.

Structure of Leaves of Selaginella densa.—Dr. M'Nab exhibited preparations of an undetermined species of *Selaginella* which was cultivated by Mr. Sim of Foot's Cray, Kent, as *Selaginella densa*. On examination it was observed that stomata were developed along the margins of the leaves as well as in the usual position near the mid-rib. A similar arrangement of marginal stomata occurs in cultivated specimens of *Selaginella Poulteri*.

Section of a clastic Rock from Bray Head exhibited.—Prof. V. Ball exhibited a section of a dense purple-coloured rock which is found near the southern extremity of the section of Cambrian rocks forming Bray Head. The mode of occurrence of this rock being for the most part obscure, although at one point it is distinctly stratified, this, together with its density and hardness, made it desirable to examine its microscopical characters. It proves to be a distinctly clastic rock, consisting mainly of small fragments of quartz in a ferruginous matrix. It may be regarded as a somewhat exceptional variety of the group of rocks of this age to which the term "grit" used to be applied by Prof. Jukes.

Zygospores of Euastrum elegans and E. pectinatum exhibited for comparison and contrast.—Mr. Archer drew attention to examples of the zygospores of two sufficiently common species of *Euastrum*, viz. *Euastrum elegans* and *E. pectinatum*. These zygospores, of course, have a strong family resemblance, not only to each other, but to other species of *Euastrum*, yet their differences of appearance, or *tout-ensemble*, were readily discernible. The zygospores in the genus are globular, and beset by usually not very numerous, often rather elongate, very slightly tapering, bluntly ending, semi-pellucid "finger-like" spines. In the *E.-elegans* zygospore they are more elongate, more curved, less numerous than in that of *E. pectinatum*, where they are thickly studded, short and straight; hence the latter makes a prettier object.

Sections of Halisarca lobularis.—Prof. Sollas exhibited a series of sections of *Halisarca lobularis*, from Roskoff, Brittany, showing the various stages of development of the young embryo within the matrical tissue.

Characters of Stamen-hairs of Narthecium ossifragum.—Mr. Greenwood Pim showed hairs from the stamen of *Narthecium ossifragum*. These hairs, which clothe the stamens very densely, are pluricellular, consisting of oblong cells, each of which shows spiral striations, and contain numerous large globules, apparently of oil, and which when fresh are of a yellow colour.

BIBLIOGRAPHICAL NOTICES.

An Elementary Course of Botany, Structural, Physiological, and Systematic. By the late Professor Arthur Henfrey, F.R.S., F.L.S., &c. Fourth Edition. By Maxwell T. Masters, M.D., F.R.S., F.L.S., assisted by A. W. Bennett, M.A., B.Sc., F.L.S. Van Voorst, 1884.

If King Solomon had been pursuing his botanical studies, "from the Cedar of Lebanon to the hyssop that springeth out of the wall," in England at the present day, he would probably, in stating that "of the making of many books there is no end," have made special reference to the text-books of his favourite science. Out of some few good, some bad, and many indifferent text-books of botany, Dr. Masters and Mr. Bennett are to be congratulated upon having edited, and Mr. Van Voorst upon publishing, the most complete work of the kind, which represents the recent progress of the science, in our own or perhaps in any language. What faults we have to find will not, as a rule, be in matters of fact or of omission; but mainly in questions of inclusion and arrangement. The present is the fourth edition of a work that originally appeared in 1857, the second